

## Review

### Order of Operations

P

E

MD

AS

### Number Systems

$\mathbb{N}$  = natural #s =

$\mathbb{W}$  = whole #s =

$\mathbb{Z}$  = integers =

$\mathbb{Q}$  = rational numbers =

irrational numbers

$\mathbb{R}$  = real numbers

### Flow chart

## Review (cont)

### Interval Notation

$$-\infty < x < a, \quad (-\infty, a)$$

$$a < x < \infty, \quad (a, \infty)$$

$$a < x < b, \quad (a, b)$$

$$a \leq x \leq b, \quad [a, b]$$

$$a \leq x < b, \quad [a, b)$$

$$a < x \leq b, \quad (a, b]$$

Ex 1  
Evaluate

$$(a) \quad \frac{(-5)(-3) - (-2)(4)}{-9 + 2}$$

$$(b) \quad \frac{|3 - |4 - 11||}{-|5^2 - 3^2|}$$

## Review (cont)

### Rules of Exponents

### Example

$$\textcircled{1} a^0 = 1 \quad \underline{\text{if}} \quad a \neq 0$$

$$\textcircled{2} a^m a^n = a^{m+n}$$

$$\textcircled{3} \frac{a^m}{a^n} = a^{m-n} \quad (a \neq 0)$$

$$\textcircled{4} (ab)^m = a^m b^m$$

$$\textcircled{5} \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

$$\textcircled{6} (a^m)^n = a^{mn}$$

$$\textcircled{7} a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$$

★  $0^0$  undefined ... but why?

Review (cont)

Ex 2 Simplify

(a)  $(-32x^5)^{-3}$

(b)  $\left(\frac{-2}{5}\right)^{-4}$

(c)  $\left(\frac{4x^{-1}y^{-15}}{2^{-2}x^5y^{-5}}\right)^{-2}$

(d)  $(-8a^{-3}b^2c) \div (2a^5b^4)$

## Review (cont)

### Rational Exponents

$$\textcircled{1} \sqrt[n]{a} = b \Leftrightarrow a = b^n \quad (\text{principal } n^{\text{th}} \text{ root})$$

$$\textcircled{2} a^{1/n} = \sqrt[n]{a}$$

$$\textcircled{3} a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

Ex 3 Simplify

(a)  $(-8)^{-2/3}$

(b)  $(x^{-2/3})^{-2/5}$

(c)  $\sqrt{32x^5y^2}$  (assume  $y > 0$ )

## Review (cont)

Polynomials  $a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$

$n = \text{degree}$

$a_i$  is  $i^{\text{th}}$  coefficient

$a_n = \text{leading coefficient}$

$$a_i \in \mathbb{R}$$

Ex 4 Simplify

(a)  $2(x^3 + 3)(2x^2 - 5)$

(b) 
$$\frac{16x^2 + 4xy^2 + 8x}{4xy}$$

Review (cont)

Ex 5 Factor completely.

(a)  $x^2 + 6x + 8$

(b)  $4x^2 - 8x - 60$

(c)  $x^4 - 3x^2 - 4$

# 1.1 Linear Equations in One Variable

Vocab

equation

vs.

expression

identity

equivalent equations  
(same as "keeping the  
balance scale balanced")

\* Solve equations and simplify expressions

Ex 1 Solve.

(a)  $3x + 22 = 7x + 2$

(b)  $\frac{2}{3}x - 1 = \frac{x-2}{2}$



1.1 (cont)

Ex 2 Simplify.

(a)  $3(x-1) + 2x + 5 - 7$

(b)  $4 - (2x+5) + 6 + 5(x-3)$

Ex 3 Solve these rational eqns (that turn into linear eqns). Note: check the domain.

(a)  $\frac{2x}{x-3} = 4 + \frac{6}{x-3}$

vocab

rational eqn  $\Rightarrow$

domain  $\Rightarrow$

1.1 (cont)

Ex 3 (cont)

$$(b) \quad \frac{3}{x} + \frac{1}{4} = \frac{2}{3} + \frac{1}{x}$$

EX 4 Suppose a professor counts the final exam as being equal to each of the other tests in her course, and she will also charge the lowest test score to match the final exam score if the final exam score is higher. If a student's four test scores are 83, 67, 52 and 90, what is the lowest score the student can earn on the final exam and still obtain an 80 average for the course?

1.1 (cont)

Ex 5 Three less than 4 times a number is 25.  
What is the number?

Ex 6 The perimeter of a rectangle is 700 ft and the length of the rectangle is four times as long as the width. Find the dimensions of the rectangle.

## 1.2 Linear Inequalities in One Variable

### Linear Inequality

Can be written in the form  $ax + b \leq c$ .

To solve a linear inequality, we do the same steps as we do to solve a linear eqn.

The only difference is we need to switch the sign when we multiply or divide by a negative number.

Ex 1       $\frac{3}{2}x + 3 \geq -6$

Solve + graph soln.

Ex 2       $\frac{5x+3}{8} - 1 > \frac{x+4}{6} + 1$

Solve + graph soln.

## 1.2 (cont)

Ex 3 Translate to an inequality.

Three times a number is less than 13 and greater than -3.

Ex 4 An investor wants to invest a total of \$10,000 in 2 different accounts. The riskier investment yields an annual average of 9.5% profit and the safer investment has an annual yield (average) of 4.5%. How much money should be invested in each acct in order to earn at least \$600 profit in a year?

1.2 (cont)

Ex 5 A product sells for \$20 and has a unit cost of \$15, and fixed costs of \$200,000. Find the least number of products that must be sold to have a profit.

### 1.3 Equations of Lines

Linear Eqn in Two variables

can be written as

$$y = mx + b$$

where  $m, b \in \mathbb{R}$

( $y$  = output variable)

( $x$  = input variable)

Slope (of a line)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

$m = 0$  for  
horizontal  
line

$m$  is undefined  
for vertical line

Parallel lines

have same  
slope

Perpendicular  
lines

have slopes  
that multiply  
to  $-1$

$$m_{\perp} = \frac{-1}{m}$$

Eqns of Line

① Slope-Intercept ( $0, b$ )  $y$ -  
Intercept

$$y = mx + b \quad m = \text{slope}$$

② Point-slope ( $x_1, y_1$ ) pt on  
line

$$y - y_1 = m(x - x_1) \quad m = \text{slope}$$

Ex 1 (a) Find the slope of the line between  
(3, 2) and (-7, -5)

(b) Find the eqn of the line (in (a)).

### 1.3 (cont)

EX2 Find the eqn of the line through  
(4, -3) and (4, 5).

EX3 For  $4 - 5y + 7x = -10$ , find the y-intercept  
and slope.

EX4 Find the eqn of the line with slope -3  
and y-intercept (0, 4)



### 1.3 (cont)

Ex 5 Find the eqn of the line through  $(1, -5)$   
and (a) parallel to  $3x - 6y = 5$   
(b) perpendicular

Ex 6 Water freezes at  $32^\circ\text{F}$  which is  $0^\circ\text{C}$ . Water boils at  $212^\circ\text{F}$  which is the same as  $100^\circ\text{C}$ . What Celsius temperature corresponds to  $70^\circ\text{F}$ ? Write a linear eqn that fits these data.

# 1.4 Systems of linear Eqns

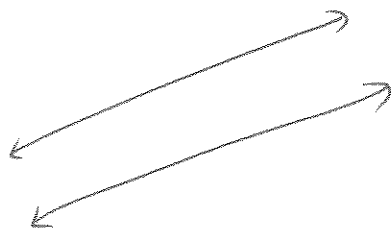
## vocab

System of eqns:

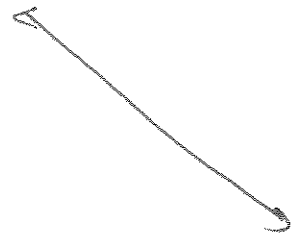
Soln :



one soln



no solns  
(lines are ||)



$\infty$  solns  
(lines are the same)

## Methods

① substitution

② Elimination

1.4 (cont)

Ex 1 Solve

$$x - \frac{3}{4}y = -9$$

$$\frac{1}{3}x = \frac{1}{4}y - 3$$

Ex 2 Solve

$$3(2x + 3y - 2) = -x + y$$

$$x + 5 = 2 - 5y$$

1.4 (cont)

Ex 3

Solve

$$x = -3$$

$$y = 1$$

Ex 4

$$3x + 15y = -6$$

$$-x - 5y = 2$$

Ex 5

$$0.9x + 0.5y = -9.4$$

$$1.8x = -y$$

1.4 (cont)

Ex 6 Solve

$$5z = 15$$

$$x - 2y + 3z = 17$$

$$2x + 3y + z = 12$$

Ex 7 Jack's basketball team scored 41 less than two times the number of pts that Dylan's team scored. The sum of both teams' final pts was 106. How many pts did each team score?